



EFSA Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF); Scientific Opinion on Flavouring Group Evaluation 309 (FGE.309): Sodium Diacetate

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SCIENTIFIC OPINION

Scientific Opinion on Flavouring Group Evaluation 309 (FGE.309):

Sodium Diacetate¹

EFSA Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF)^{2, 3}

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

The Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids of the European Food Safety Authority was requested to evaluate sodium diacetate [FL-no: 16.073] in the Flavouring Group Evaluation 309, using the Procedure in Commission Regulation (EC) No 1565/2000. However, although in principle it would be possible to evaluate sodium diacetate via the Procedure, the Panel considered that this is not necessary, since the substance and its dissociation products are covered by the group ADI for acetic acid and sodium acetate, including sodium diacetate, derived by the Scientific Committee on Food. Based on this group ADI, the use as sodium diacetate as a flavouring substance at the current levels of dietary intake raises no safety concern.

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1 On request from the Commission, Question No EFSA-Q-2011-00234, adopted on 24 March 2011.

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SUMMARY

The European Food Safety Authority (EFSA) asked the Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (the Panel) to provide scientific advice to the Commission on the implications for human health of chemically defined flavouring substances used in or on foodstuffs in the Member States. In particular, the Panel was requested to evaluate one flavouring substance in the Flavouring Group Evaluation 309, using the Procedure as referred to in the Commission Regulation (EC) No 1565/2000. This flavouring substance belongs to chemical group 01 Annex I of the Commission Regulation (EC) No 1565/2000.

The flavouring substance is sodium diacetate [FL-no: 16.073].

The candidate substance belongs to structural class I and has not been reported to occur naturally in foods.

The substance has not been reported to occur naturally in foods. It does not possess structures which can give rise to stereoisomerism.

In its evaluation, the Panel as a default used the “Maximised Survey-derived Daily Intake” (MSDI) approach to estimate the *per capita* intakes of the flavouring substances in Europe. However, when the Panel examined the information provided by the European Flavouring Industry on the use levels in various foods, it appeared obvious that the MSDI approach in a number of cases would grossly underestimate the intake by regular consumers of products flavoured at the use level reported by the Industry, especially in those cases where the annual production values were reported to be small. In consequence, the Panel had reservations about the data on use and use levels provided and the intake estimates obtained by the MSDI approach.

In the absence of more precise information that would enable the Panel to make a more realistic estimate of the intakes of the flavouring substances, the Panel has decided also to perform an estimate of the daily intakes per person using a “modified Theoretical Added Maximum Daily Intake” (mTAMDI) approach based on the normal use levels reported by Industry. In those cases where the mTAMDI approach indicated that the intake of a flavouring substance might exceed its corresponding threshold of concern, the Panel decided not to carry out a formal safety assessment using the Procedure. In these cases the Panel requires more precise data on use and use levels.

The estimated daily *per capita* intake (MSDI) of sodium diacetate [FL-no: 16.073] from use as a flavouring substance is 4000 microgram per person per day.

No concern of genotoxicity has been identified for sodium diacetate.

The metabolism data available were sufficient to conclude that the candidate substance is rapidly absorbed, metabolised to endogenous innocuous products and excreted through normal biological mechanisms.

The former Scientific Committee on Food (SCF) has derived a group Acceptable Daily Intake (ADI) “not specified” for acetic acid and sodium acetate, including sodium diacetate (CEC, 1991). Because of the availability of this ADI, the Panel considered that the application of the Procedure for sodium diacetate is not necessary. The *per capita* intake estimate (MSDI) of 4000 microgram per person per day is in concordance with the group ADI and no safety concern is identified when sodium diacetate is used as a flavouring substance at the current level of use in the EU.

No use levels are provided for sodium diacetate, therefore no mTAMDI can be calculated. Thus, further information is required. This would include more reliable intake data.

In order to determine whether the conclusion for the candidate substance can be applied to the materials of commerce, it is necessary to consider the available specifications. Adequate specifications, including complete purity criteria and identity, for the materials of commerce have been provided for the flavouring substance.

In conclusion, the Panel concluded that sodium diacetate [FL-no: 16.073] would not pose a safety concern when used as a flavouring substance, at the anticipated intake levels based on the MSDI approach.

KEYWORDS

Food safety, flavouring, acetate, diacetate, FGE.309.

TABLE OF CONTENTS

Abstract	1
Summary	2
Keywords	3
Table of contents	4
Background	5
Terms of Reference	5
Assessment	5
1. Presentation of the Substances in Flavouring Group Evaluation 309	5
1.1. Description	5
1.2. Stereoisomers	5
1.3. Natural Occurrence in Food	6
2. Specifications	6
3. Intake Data	6
3.1. Estimated Daily <i>per Capita</i> Intake (MSDI Approach)	6
3.2. Intake Estimated on the Basis of the Modified TAMDI (mTAMDI)	7
4. Absorption, Distribution, Metabolism and Elimination	7
5. Application of the Procedure for the Safety Evaluation of Flavouring Substances	7
6. Comparison of the Intake Estimations Based on the MSDI Approach and the mTAMDI Approach	8
7. Considerations of Combined Intakes from Use as Flavouring Substances	8
8. Toxicity	8
8.1. Acute Toxicity	8
8.2. Genotoxicity Studies	9
8.3. Derivation of ADI	9
9. Conclusions	9
Table 1: Specification Summary of the Substances in the Flavouring Group Evaluation 309	10
<i>n.a. not applicable.</i> Table 2: Summary of Safety Evaluation Applying the Procedure (Based on Intakes Calculated by the MSDI Approach)	10
Table 2: Summary of Safety Evaluation Applying the Procedure (Based on Intakes Calculated by the MSDI Approach)	11
Annex I: Procedure for the Safety Evaluation	12
Annex II: Use Levels / mTAMDI	14
Annex III: Toxicity	17
References	18
Abbreviations	20

BACKGROUND

Regulation (EC) No 2232/96 of the European Parliament and the Council (EC, 1996a) lays down a Procedure for the establishment of a list of flavouring substances the use of which will be authorised to the exclusion of all other substances in the EU. In application of that Regulation, a Register of flavouring substances used in or on foodstuffs in the Member States was adopted by Commission Decision 1999/217/EC (EC, 1999a), as last amended by Commission Decision 2009/163/EC (EC, 2009a). Each flavouring substance is attributed a FLAVIS-number (FL-number) and all substances are divided into 34 chemical groups. Substances within a group should have some metabolic and biological behaviour in common.

Substances which are listed in the Register are to be evaluated according to the evaluation programme laid down in Commission Regulation (EC) No 1565/2000 (EC, 2000a), which is broadly based on the Opinion of the Scientific Committee on Food (SCF, 1999a). For the submission of data by the manufacturer, deadlines have been established by Commission Regulation (EC) No 622/2002 (EC, 2002b).

After the completion of the evaluation programme the Union List of flavouring substances for use in or on foods in the EU shall be adopted (Article 5 (1) of Regulation (EC) No 2232/96) (EC, 1996a).

TERMS OF REFERENCE

The European Food Safety Authority (EFSA) is requested to carry out a risk assessment on flavouring substances in the Register prior to their authorisation and inclusion in a Union List according to Commission Regulation (EC) No 1565/2000 (EC, 2000a). In addition, the Commission requested EFSA to evaluate newly notified flavouring substances, where possible, before finalising the evaluation programme.

ASSESSMENT

1. Presentation of the Substances in Flavouring Group Evaluation 309

1.1. Description

The present Flavouring Group Evaluation 309 (FGE.309), deals with one flavouring substance (candidate substance) sodium diacetate [FL-no: 16.073] from chemical group 01, Annex I of Commission Regulation (EC) No 1565/2000 (EC, 2000a).

The candidate substance under consideration in the present evaluation, with its chemical Register name, FLAVIS- (FL-), Chemical Abstract Service- (CAS-), Council of Europe- (CoE-) and Flavor and Extract Manufacturers Association- (FEMA-) number, and structure is listed in Table 1.

No supporting substances were suggested by Industry for this substance. However, the Panel noted that the candidate substance is covered by the group Acceptable Daily Intake (ADI) for acetate and sodium acetate including sodium diacetate, derived in 1990 by the former SCF (CEC, 1991), to support the use of these substances as food additives for acetic acid (E260) and sodium (di)acetate (E262).

A summary of the outcome of the safety evaluation is summarised in Table 2.

1.2. Stereoisomers

For sodium diacetate [FL-no: 16.073] stereoisomerism is not possible.

1.3. Natural Occurrence in Food

Sodium diacetate [FL-no: 16.073] is not reported to occur naturally in any food items (TNO, 2010).

2. Specifications

Purity criteria for the candidate substance has been provided by the Flavour Industry (EFFA, 2008d) (Table 1).

Judged against the requirements in Annex II of Commission Regulation (EC) No 1565/2000 (EC, 2000a), this information is adequate for the candidate substance (See Table 1).

3. Intake Data

Annual production volumes of the flavouring substances as surveyed by the Industry can be used to calculate the “Maximised Survey-derived Daily Intake” (MSDI) by assuming that the production figure only represents 60 % of the use in food due to underreporting and that 10 % of the total EU population are consumers (SCF, 1999a).

However, the Panel noted that due to year-to-year variability in production volumes, to uncertainties in the underreporting correction factor and to uncertainties in the percentage of consumers, the reliability of intake estimates on the basis of the MSDI approach is difficult to assess.

The Panel also noted that in contrast to the generally low *per capita* intake figures estimated on the basis of this MSDI approach, in some cases the regular consumption of products flavoured at use levels reported by the Flavour Industry in the submissions would result in much higher intakes. In such cases, the human exposure thresholds below which exposures are not considered to present a safety concern might be exceeded.

Considering that the MSDI model may underestimate the intake of flavouring substances by certain groups of consumers, the SCF recommended also taking into account the results of other intake assessments (SCF, 1999a).

One of the alternatives is the “Theoretical Added Maximum Daily Intake” (TAMDI) approach, which is calculated on the basis of standard portions and upper use levels (SCF, 1995) for flavourable beverages and foods in general, with exceptional levels for particular foods. This method is regarded as a conservative estimate of the actual intake by most consumers because it is based on the assumption that the consumer regularly eats and drinks several food products containing the same flavouring substance at the upper use level.

One option to modify the TAMDI approach is to base the calculation on normal rather than upper use levels of the flavouring substances. This modified approach is less conservative (e.g., it may underestimate the intake of consumers being loyal to products flavoured at the maximum use levels reported) (EC, 2000a). However, it is considered as a suitable tool to screen and prioritise the flavouring substances according to the need for refined intake data (EFSA, 2004a).

3.1. Estimated Daily *per Capita* Intake (MSDI Approach)

The intake estimation is based on the Maximised Survey-derived Daily Intake (MSDI) approach, which involves the acquisition of data on the amounts used in food as flavourings (SCF, 1999a). These data are derived from surveys on annual production volumes in Europe. These surveys were conducted in 1995 by the International Organization of the Flavour Industry, in which flavour manufacturers reported the total amount of each flavouring substance incorporated into food sold in the EU during the previous year (IOFI, 1995). The intake approach does not consider the possible natural occurrence in food.

Average *per capita* intake (MSDI) is estimated on the assumption that the amount added to food is consumed by 10 % of the population⁴ (Eurostat, 1998). This is derived for candidate substances from estimates of annual volume of production provided by Industry and incorporates a correction factor of 0.6 to allow for incomplete reporting (60 %) in the Industry surveys (SCF, 1999a).

The total annual volume of production of the candidate substance sodium diacetate [FL-no: 16.073] in the present Flavouring Group Evaluation (FGE.309) from use as flavouring substance in Europe has been reported to be approximately 33000 kg (EFFA, 2008c).

On the basis of the annual volume of production reported for the candidate substance, the daily *per capita* intake for this flavouring has been estimated. The estimated daily *per capita* intake of sodium diacetate [FL-no: 16.073] from use as a flavouring substance is 4000 microgram (Table 2).

3.2. Intake Estimated on the Basis of the Modified TAMDI (mTAMDI)

The method for calculation of modified Theoretical Added Maximum Daily Intake (mTAMDI) values is based on the approach used by SCF up to 1995 (SCF, 1995).

The assumption is that a person may consume a certain amount of flavourable foods and beverages per day.

For the candidate substance [FL-no: 16.073] no use and use levels are provided. Therefore an mTAMDI estimate cannot be calculated.

4. Absorption, Distribution, Metabolism and Elimination

The present FGE consists of one candidate substance sodium diacetate [FL-no: 16.073].

There are no data on the metabolism of the candidate substance. It is anticipated that the substance would rapidly dissociate to sodium ions and acetate (or acetic acid), which both are normal endogenous substances (Voet and Voet, 2004). Via the citric acid cycle, acetate is rapidly metabolised to carbon dioxide, which will be eliminated from the body, predominantly via the exhaled air and in smaller quantities also via urine and faeces. Acetic acid can also be used as a building block e.g. in the biosynthesis of fatty acids (JECFA, 1974b; CEC, 1991; Voet and Voet, 2004; JECFA, 2004b). It is concluded that the dissociation and metabolism of the candidate substance results in the formation of endogenous innocuous products.

5. Application of the Procedure for the Safety Evaluation of Flavouring Substances

The application of the Procedure as referred to in the Commission Regulation (EC) No 1565/2000 (the Procedure – shown in schematic form in Annex I of this FGE) is based on intakes estimated on the basis of the MSDI approach. Where the mTAMDI approach indicates that the intake of a flavouring substance might exceed its corresponding threshold of concern, a formal safety assessment is not carried out using the Procedure. In these cases the Panel requires more precise data on use and use levels. For comparison of the intake estimations based on the MSDI approach and the mTAMDI approach, see Section 6.

Although in principle it would be possible to evaluate sodium diacetate via the Procedure, the Panel considered that this is not necessary, since the substance and its dissociation products are covered by

⁴ EU figure 375 millions. This figure relates to EU population at the time for which production data are available, and is consistent (comparable) with evaluations conducted prior to the enlargement of the EU. No production data are available for the enlarged EU.

the group ADI for acetic acid and sodium acetate, including sodium diacetate, derived by SCF in 1990 (CEC, 1991) when these substances were evaluated as food additives (for acetic acid (E260) and sodium acetate (E262), including sodium diacetate). This group ADI is “not specified”, and these substances can be used in food “*quantum satis*” (EC, 2010). Based on this group ADI, the use as sodium diacetate as a flavouring substance at the current levels of use raises no safety concern (JECFA, 1974b).

6. Comparison of the Intake Estimations Based on the MSDI Approach and the mTAMDI Approach

No use and use levels are provided for the candidate substance, therefore no mTAMDI can be calculated.

Thus, further information is required. This would include more reliable intake data and then, if required, additional toxicological data.

Table 6.1 Estimated intakes based on the MSDI approach and the mTAMDI approach

FL-no	EU Register name	MSDI (µg/capita/day)	mTAMDI (µg/person/day)	Structural class	Threshold of concern (µg/person/day)
16.073	Sodium diacetate	4000		Class I	1800

7. Considerations of Combined Intakes from Use as Flavouring Substances

Because of structural similarities of candidate and supporting substances, it can be anticipated that many of the flavourings are metabolised through the same metabolic pathways and that the metabolites may affect the same target organs. Further, in case of combined exposure to structurally related flavourings, the pathways could be overloaded. Therefore, combined intake should be considered. As flavourings not included in this FGE may also be metabolised through the same pathways, the combined intake estimates presented here are only preliminary. Currently, the combined intake estimates are only based on MSDI exposure estimates, although it is recognised that this may lead to underestimation of exposure. After completion of all FGEs, this issue should be readdressed.

The total estimated combined daily *per capita* intake of structurally related flavourings is estimated by summing the MSDI for individual substances.

For the candidate substance sodium diacetate [FL-no: 16.073] the estimated daily *per capita* intake as flavouring is 4000 microgram. However, no safety concern is anticipated since this *per capita* exposure estimate is in concordance with the group ADI “not specified” covering acetic acid, sodium acetate and sodium diacetate. Even if exposure to acetic acid or acetate from other sources were included in the estimate for combined exposure, no safety concern for combined intake would have been identified.

8. Toxicity

8.1. Acute Toxicity

A literature survey did not reveal any new data on acute toxicity for the candidate substance.

The JECFA (JECFA, 1974b) concluded that there was no direct information on the LD₅₀ of sodium diacetate in animals but that it is likely to be similar to that of “neutralised acetic acid”. Some additional data on acute toxicity of “neutralised acetic acid” have been compiled in Table III.1.

8.2. Genotoxicity Studies

A literature survey did not reveal any genotoxicity studies for the candidate substance. However, no concern of genotoxicity is identified.

8.3. Derivation of ADI

In 1990, the former SCF has derived a group ADI for acetic acid and sodium acetate, including sodium diacetate based on the following reasoning:

“Human studies determining the maximum metabolic load of acetate are not available. In evaluating the acceptance of acetates, emphasis is placed on their established metabolic pathway and the consumption by man as normal constituents of the diet. The Committee established a group ADI not specified for acetate including diacetate” (CEC, 1991).

Based on the current knowledge, the Panel does not see any reasons to deviate from this view.

9. Conclusions

The candidate substance sodium diacetate [FL-no: 16.073] is a compound from chemical group 01 containing acetate moieties. For this substance, stereoisomerism is not possible.

The substance has not been reported to occur naturally in foods.

The estimated daily *per capita* intake (MSDI) of sodium diacetate [FL-no: 16.073] from use as a flavouring substance is 4000 microgram per person per day.

No concern of genotoxicity has been identified for sodium diacetate.

The metabolism data available were sufficient to conclude that the candidate substance is rapidly absorbed, metabolised to endogenous innocuous products and excreted through normal biological mechanisms.

The *per capita* intake estimate of 4000 microgram per person per day is in concordance with the group ADI “not specified” as set in 1990 by the former SCF for acetic acid and sodium acetate, including sodium diacetate (CEC, 1991). No safety concern is identified when sodium diacetate is used as a flavouring substance at the current level of use in the EU.

No use levels are provided for sodium diacetate, therefore no mTAMDI can be calculated. Thus, further information is required. This would include more reliable intake data.

In order to determine whether the conclusion for the candidate substance can be applied to the materials of commerce, it is necessary to consider the available specifications. Adequate specifications, including complete purity criteria and identity, for the materials of commerce have been provided for the flavouring substance.

In conclusion, the Panel concluded that sodium diacetate [FL-no: 16.073] would not pose a safety concern when used as a flavouring substance, at the anticipated intake levels based on the MSDI approach.

TABLE 1: SPECIFICATION SUMMARY OF THE SUBSTANCES IN THE FLAVOURING GROUP EVALUATION 309

Table 1: Specification Summary of the Substances in the Flavouring Group Evaluation 309

FL-no	EU Register name	Structural formula	FEMA no CoE no CAS no	Phys.form Mol.formula Mol.weight	Solubility 1) Solubility in ethanol 2)	Boiling point, °C 3) Melting point, °C ID test Assay minimum	Refrac. Index 4) Spec.gravity 5)	Specification comments
16.073	Sodium diacetate	$(\text{CH}_3\text{COO})_2\text{NaCH}_3\text{COOH}$	3900 126-96-5	Solid $\text{C}_4\text{H}_7\text{NaO}_4$ 142.09	Soluble Insoluble	Decomposes NMR 99.7%	n.a. n.a.	

1) Solubility in water, if not otherwise stated.

2) Solubility in 95 % ethanol, if not otherwise stated.

3) At 1013.25 hPa, if not otherwise stated.

4) At 20°C, if not otherwise stated.

5) At 25°C, if not otherwise stated.

n.a. not applicable.

TABLE 2: SUMMARY OF SAFETY EVALUATION APPLYING THE PROCEDURE (BASED ON INTAKES CALCULATED BY THE MSDI APPROACH)

Table 2: Summary of Safety Evaluation Applying the Procedure (based on intakes calculated by the MSDI approach)

FL-no	EU Register name	Structural formula	MSDI 1) (µg/capita/day)	Class 2) Evaluation procedure path 3)	Outcome on the named compound [4) or 5]	Outcome on the material of commerce [6), 7), or 8)]	Evaluation remarks
16.073	Sodium diacetate	$(\text{CH}_3\text{COO})\text{NaCH}_3\text{COOH}$	4000	Class I Not evaluated through the Procedure.	4)	6)	a)

1) EU MSDI: Amount added to food as flavour in (kg / year) $\times 10\text{E}9 / (0.1 \times \text{population in Europe} (= 375 \times 10\text{E}6) \times 0.6 \times 365) = \mu\text{g/capita/day}$.

2) Thresholds of concern: Class I = 1800 µg/person/day, Class II = 540 µg/person/day, Class III = 90 µg/person/day.

3) Procedure path A substances can be predicted to be metabolised to innocuous products. Procedure path B substances cannot.

4) No safety concern based on intake calculated by the MSDI approach of the named compound.

5) Data must be available on the substance or closely related substances to perform a safety evaluation.

6) No safety concern at estimated level of intake of the material of commerce meeting the specification of Table 1 (based on intake calculated by the MSDI approach).

7) Tentatively regarded as presenting no safety concern (based on intake calculated by the MSDI approach) pending further information on the purity of the material of commerce and/or information on stereoisomerism.

8) No conclusion can be drawn due to lack of information on the purity of the material of commerce.

a) The intake of [FL-no: 16.073] is compliant with the ADI "not specified" derived by SCF in 1990 (CEC, 1991) for acetic acid and sodium acetate, including sodium diacetate, therefore no safety concern would be anticipated.

ANNEX I: PROCEDURE FOR THE SAFETY EVALUATION

The approach for a safety evaluation of chemically defined flavouring substances as referred to in Commission Regulation (EC) No 1565/2000 (EC, 2000a), named the "Procedure", is shown in schematic form in Figure I.1. The Procedure is based on the Opinion of the Scientific Committee on Food expressed on 2 December 1999 (SCF, 1999a), which is derived from the evaluation Procedure developed by the Joint FAO/WHO Expert Committee on Food Additives at its 44th, 46th and 49th meetings (JECFA, 1995; JECFA, 1996a; JECFA, 1997a; JECFA, 1999b).

The Procedure is a stepwise approach that integrates information on intake from current uses, structure-activity relationships, metabolism and, when needed, toxicity. One of the key elements in the Procedure is the subdivision of flavourings into three structural classes (I, II, III) for which thresholds of concern (human exposure thresholds) have been specified. Exposures below these thresholds are not considered to present a safety concern.

Class I contains flavourings that have simple chemical structures and efficient modes of metabolism, which would suggest a low order of oral toxicity. Class II contains flavourings that have structural features that are less innocuous, but are not suggestive of toxicity. Class III comprises flavourings that have structural features that permit no strong initial presumption of safety, or may even suggest significant toxicity (Cramer et al., 1978). The thresholds of concern for these structural classes of 1800, 540 or 90 microgram/person/day, respectively, are derived from a large database containing data on subchronic and chronic animal studies (JECFA, 1996a).

In Step 1 of the Procedure, the flavourings are assigned to one of the structural classes. The further steps address the following questions:

- can the flavourings be predicted to be metabolised to innocuous products⁵ (Step 2)?
- do their exposures exceed the threshold of concern for the structural class (Step A3 and B3)?
- are the flavourings or their metabolites endogenous⁶ (Step A4)?
- does a NOAEL exist on the flavourings or on structurally related substances (Step A5 and B4)?

In addition to the data provided for the flavouring substances to be evaluated (candidate substances), toxicological background information available for compounds structurally related to the candidate substances is considered (supporting substances), in order to assure that these data are consistent with the results obtained after application of the Procedure.

The Procedure is not to be applied to flavourings with existing unresolved problems of toxicity. Therefore, the right is reserved to use alternative approaches if data on specific flavourings warranted such actions.

⁵ "Innocuous metabolic products": Products that are known or readily predicted to be harmless to humans at the estimated intakes of the flavouring agent" (JECFA, 1997a).

⁶ "Endogenous substances": Intermediary metabolites normally present in human tissues and fluids, whether free or conjugated; hormones and other substances with biochemical or physiological regulatory functions are not included (JECFA, 1997a).

Procedure for Safety Evaluation of Chemically Defined Flavouring Substances

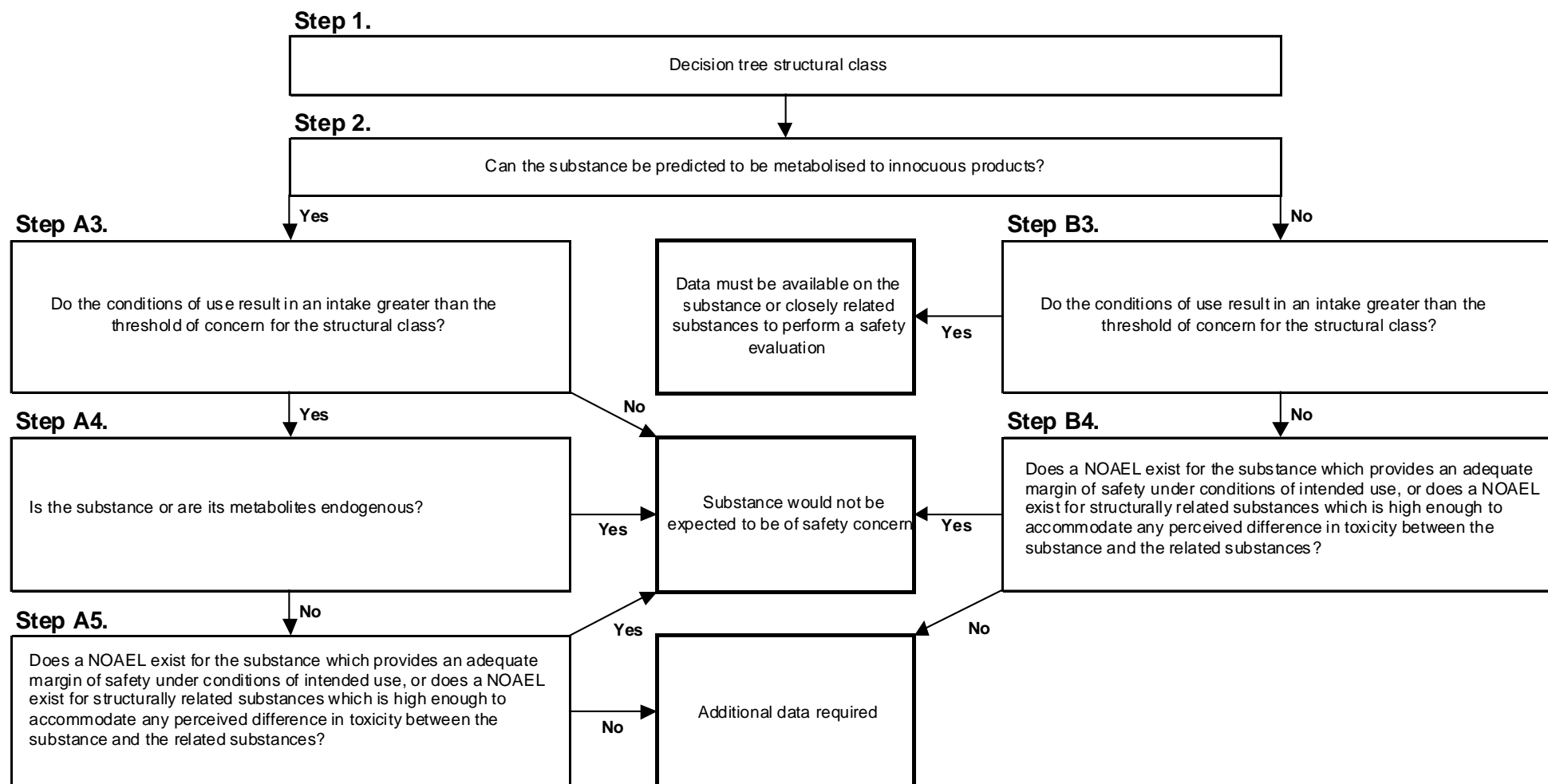


Figure I.1 Procedure for Safety Evaluation of Chemically Defined Flavouring Substances

ANNEX II: USE LEVELS / mTAMDI

I.1 Normal and Maximum Use Levels

For each of the 18 Food categories (Table II.1.1) in which the candidate substances are used, Flavour Industry reports a “normal use level” and a “maximum use level” (EC, 2000a). According to the Industry the “normal use” is defined as the average of reported usages and “maximum use” is defined as the 95th percentile of reported usages (EFFA, 2002i). The normal and maximum use levels in different food categories have been extrapolated from figures derived from 12 model flavouring substances (EFFA, 2004e).

Table II.1.1 Food categories according to Commission Regulation (EC) No 1565/2000 (EC, 2000a)

Food category	Description
01.0	Dairy products, excluding products of category 02.0
02.0	Fats and oils, and fat emulsions (type water-in-oil)
03.0	Edible ices, including sherbet and sorbet
04.1	Processed fruit
04.2	Processed vegetables (incl. mushrooms & fungi, roots & tubers, pulses and legumes), and nuts & seeds
05.0	Confectionery
06.0	Cereals and cereal products, incl. flours & starches from roots & tubers, pulses & legumes, excluding bakery
07.0	Bakery wares
08.0	Meat and meat products, including poultry and game
09.0	Fish and fish products, including molluscs, crustaceans and echinoderms
10.0	Eggs and egg products
11.0	Sweeteners, including honey
12.0	Salts, spices, soups, sauces, salads, protein products, etc.
13.0	Foodstuffs intended for particular nutritional uses
14.1	Non-alcoholic (“soft”) beverages, excl. dairy products
14.2	Alcoholic beverages, incl. alcohol-free and low-alcoholic counterparts
15.0	Ready-to-eat savouries
16.0	Composite foods (e.g. casseroles, meat pies, mincemeat) - foods that could not be placed in categories 01.0 - 15.0

The “normal and maximum use levels” are not provided by Industry for the candidate substance in the present flavouring group (Table II.1.2).

Table II.1.2 Normal and Maximum use levels (mg/kg) for the candidate substances in FGE.308 (Flavour Industry, 2010e).

FL-no	Food Categories																	
	Normal use levels (mg/kg)																	
	Maximum use levels (mg/kg)																	
	01.0	02.0	03.0	04.1	04.2	05.0	06.0	07.0	08.0	09.0	10.0	11.0	12.0	13.0	14.1	14.2	15.0	16.0

II.2 mTAMDI Calculations

The method for calculation of modified Theoretical Added Maximum Daily Intake (mTAMDI) values is based on the approach used by SCF up to 1995 (SCF, 1995). The assumption is that a person may consume the amount of flavourable foods and beverages listed in Table II.2.1. These consumption estimates are then multiplied by the reported use levels in the different food categories and summed up.

Table II.2.1 Estimated amount of flavourable foods, beverages, and exceptions assumed to be consumed per person per day (SCF, 1995)

Class of product category	Intake estimate (g/day)
Beverages (non-alcoholic)	324.0
Foods	133.4
Exception a: Candy, confectionery	27.0
Exception b: Condiments, seasonings	20.0
Exception c: Alcoholic beverages	20.0
Exception d: Soups, savouries	20.0
Exception e: Others, e.g. chewing gum	e.g. 2.0 (chewing gum)

The mTAMDI calculations are based on the normal use levels reported by Industry. The seven food categories used in the SCF TAMDI approach (SCF, 1995) correspond to the 18 food categories as outlined in Commission Regulation (EC) No 1565/2000 (EC, 2000a) and reported by the Flavour Industry in the following way (see Table II.2.2):

- Beverages (SCF, 1995) correspond to food category 14.1 (EC, 2000a)
- Foods (SCF, 1995) correspond to the food categories 1, 2, 3, 4.1, 4.2, 6, 7, 8, 9, 10, 13, and/or 16 (EC, 2000a)
- Exception a (SCF, 1995) corresponds to food category 5 and 11 (EC, 2000a)
- Exception b (SCF, 1995) corresponds to food category 15 (EC, 2000a)
- Exception c (SCF, 1995) corresponds to food category 14.2 (EC, 2000a)
- Exception d (SCF, 1995) corresponds to food category 12 (EC, 2000a)
- Exception e (SCF, 1995) corresponds to others, e.g. chewing gum.

Table II.2.2 Distribution of the 18 food categories listed in Commission Regulation (EC) No 1565/2000 (EC, 2000a) into the seven SCF food categories used for TAMDI calculation (SCF, 1995)

Food categories according to Commission Regulation (EC) No1565/2000		Distribution of the seven SCF food categories		
Key	Food category	Food	Beverages	Exceptions
01.0	Dairy products, excluding products of category 02.0	Food		
02.0	Fats and oils, and fat emulsions (type water-in-oil)	Food		
03.0	Edible ices, including sherbet and sorbet	Food		
04.1	Processed fruit	Food		
04.2	Processed vegetables (incl. mushrooms & fungi, roots & tubers, pulses and legumes), and nuts & seeds	Food		
05.0	Confectionery			Exception a
06.0	Cereals and cereal products, incl. flours & starches from roots & tubers, pulses & legumes, excluding bakery	Food		
07.0	Bakery wares	Food		
08.0	Meat and meat products, including poultry and game	Food		
09.0	Fish and fish products, including molluscs, crustaceans and echinoderms	Food		
10.0	Eggs and egg products	Food		
11.0	Sweeteners, including honey			Exception a
12.0	Salts, spices, soups, sauces, salads, protein products, etc.			Exception d
13.0	Foodstuffs intended for particular nutritional uses	Food		
14.1	Non-alcoholic ("soft") beverages, excl. dairy products		Beverages	
14.2	Alcoholic beverages, incl. alcohol-free and low-alcoholic counterparts			Exception c
15.0	Ready-to-eat savouries			Exception b
16.0	Composite foods (e.g. casseroles, meat pies, mincemeat) - foods that could not be	Food		

Table II.2.2 Distribution of the 18 food categories listed in Commission Regulation (EC) No 1565/2000 (EC, 2000a) into the seven SCF food categories used for TAMDI calculation (SCF, 1995)

Food categories according to Commission Regulation (EC) No1565/2000	Distribution of the seven SCF food categories
placed in categories 01.0 - 15.0	

The mTAMDI value (see Table II.2.3) is not presented for the flavouring substance in the present flavouring group.

Table II.2.3 Estimated intakes based on the mTAMDI approach

FL-no	EU Register name	mTAMDI (µg/person/day)	Structural class	Threshold of concern (µg/person/day)
16.073	Sodium diacetate		Class I	1800

ANNEX III: TOXICITY

TABLE III.1: ACUTE TOXICITY

TABLE III.1: ACUTE TOXICITY					
Test material	Species	Sex	Route	LD ₅₀ (mg/kg bw)	Reference
Acetic acid	Mice	Male and Female	Gavage	4.96	(Woodard et al., 1941)
	Rats	Male	Gavage	3.31	(Woodard et al., 1941)
	Rats	Male	Gavage	3.53	(Smyth et al., 1951a)

TABLE III.2: SUBACUTE / SUBCHRONIC / CHRONIC / CARCINOGENICITY STUDIES

No Subacute / Subchronic / Chronic / Carcinogenic toxicity data are available for the candidate substance of the present Flavouring Group Evaluation.

TABLE III.3: DEVELOPMENTAL AND REPRODUCTIVE TOXICITY STUDIES

No developmental or reproductive toxicity data are available for the candidate substance of the present Flavouring Group Evaluation.

TABLE III.4: GENOTOXICITY (*IN VITRO*)

No *in vitro* mutagenicity/genotoxicity data are available for the candidate substance of the present Flavouring Group Evaluation.

TABLE III.5: GENOTOXICITY (*IN VIVO*)

No *In vivo* mutagenicity/genotoxicity data are available for the candidate substance of the present Flavouring Group Evaluation.

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ABBREVIATIONS

ADI	Acceptable Daily Intake
BW	Body weight
CAS	Chemical Abstract Service
CEF	Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids Chemical Abstract Service
CoE	Council of Europe
EC	European Commission
EFFA	European Flavour and Fragrance Association
EFSA	The European Food Safety Authority
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FEMA	Flavor and Extract Manufacturers Association
FGE	Flavouring Group Evaluation
FLAVIS (FL)	Flavour Information System (database)
ID	Identity
IOFI	International Organization of the Flavour Industry
JECFA	The Joint FAO/WHO Expert Committee on Food Additives
LD ₅₀	Lethal Dose, 50 %; Median lethal dose
MSDI	Maximised Survey-derived Daily Intake
mTAMDI	Modified Theoretical Added Maximum Daily Intake
NMR	Nuclear Magnetic Resonance
No	Number
SCF	Scientific Committee on Food
TAMDI	Theoretical Added Maximum Daily Intake
WHO	World Health Organisation